Poster-2-30

Understanding periodic electronic modulations imaged by an STM in a high temperature cuprate superconductor

Tejas Parasram Singar,[1] Ivan Maggio-Aprile,[1] Genda Gu,[2] and Christoph Renner[1]

[1] *DQMP, University of Geneva, 24 Quai Ernest-Ansermet, 1211 Geneva 4, Switzerland*
[2] *CMPMS Division, Brookhaven National Laboratory, Upton, New York 11973, USA*

High temperature cuprate superconductors (HTS) exhibit numerous electronic phases upon tuning the hole doping of their CuO_2 planes. Among them, a set of periodic charge modulations have been observed in the vicinity of the superconducting dome, raising questions about their origin and competition or cooperation with superconductivity. The existence of these orders and their intimate nature is strongly doping dependent.
We will discuss our recent STM/STS investigations on $Bi_2Sr_2Ca_1Cu_2O_{8+\delta}$ single crystals. While electronic orders in HTSs have been extensively studied using spectroscopic imaging, we focus on their identification in very low bias topographic imaging [1]. In particular, we show that the well-known $4a_0 \times 4a_0$ and $(4/3)\ a_0 \times (4/3)\ a_0$ modulations (a_0: crystallographic unit cell) in highly underdoped ($T_c \approx 52$ K) samples are absent in highly overdoped compounds ($T_c \approx 52$ K). We compare these topography measurements with spectroscopy maps to exclude possible artifacts and disentangle static charge orders from dispersive quasi-particle interference [2, 3].

[1] Hashimoto *et al.* Physical Review B 74, 064508 (2006).
[2] McElroy, K. *et al.* Nature 422, 592 596 (2003).
[3] Wang and Lee, Physical Review B 67, 020511 (R) (2003).